Remarks/Arguments

Applicants have reviewed and considered the Office Action mailed July 25, 2007. To better distinguish his invention from the art of record, applicant has amended claim 15. Claims 15-20 are now pending in this application. In view of the amendments to the claims and the remarks directed thereto, applicant requests reconsideration of the above-identified application.

In this response, applicant has submitted amended claim 15 for consideration by the Examiner. It is believed that this claim and the claims ultimately depending therefrom are neither anticipated nor rendered obvious by the cited patent to Scott et al. in view of Gove et al. and Jung.

Amended claim 15 now refers to a method for arbitrarily selectable scaling of input images represented by pixels or sub pixels arranged line by line and column by column. The method includes distributing a number of support points corresponding to a number of pixels or sub pixels in the output image across the lines or columns of the input image. Distribution is effected in such a way that the support points have distances corresponding to a number of integer pixels or sub pixels. Distribution is further effected in such a way that the distances between the support points in a line or column have a minimum variation from one another. The ratio of the number of support points to the number of pixels or sub pixels in a line or column corresponds to the desired scaling factor. This feature is supported in the original specification on page 3, line 31 to page 4, line 3. The method also includes the step of selecting or calculating a pixel or sub pixel value for a pixel or sub pixel in the output image from pixel or sub pixel values in the input image lying between a corresponding support point and a neighbouring support point. Selecting is supported on page 3, line 31 of the original specification. Calculating from a range of pixels between two support points is supported on page 4, lines 3 to 10 of the original specification. The method further includes the step of distributing the support points of two successive lines or columns such that the support points of one line have an offset with respect to the other line, for improving reproduction of fine details in the output image. For example, when support points of a first and a second line are

distributed across the respective line, they do not fall within the same columns. This feature is supported on page 5, lines 1 to 8 of the original specifications.

35 U.S.C. 112 Rejection of Claim 16

The examiner has rejected claim 16 under 35 U.S.C. 112, first paragraph as failing to comply with the written description requirement. In particular, the examiner contends that claim 16 contains subject matter not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventor, at the time the application was filed, had possession of the claimed invention.

Claim 16 recites the step of determining the values for neighboring pixels in the output image from the pixels between a corresponding support point and a neighboring support point such that they have a maximum difference. The examiner asserts that the specification does not disclose using the maximum difference. Applicant respectfully disagrees.

Figure 5 and the description at beginning of n page 12, line 14 of applicant's specification show video signals RGB applied to delay circuits 212, 214, 218 and 222 and to multiplexer 207. The delayed video signals are applied to respective circuit blocks 260, 261, 262, 263 (MaxD). The circuit blocks MaxD determine the difference between two video signals applied thereto and a third signal. To this end, the circuit blocks MaxD further receive a signal from flip-flop 269, in which the last output signal of multiplexer 238 is stored (page 14, lines 15 to 18). The last output signal of multiplexer 238, however, corresponds to the value output for the preceding support point. The function of circuit blocks MaxD is further explained with reference to Figure 6. Subtractors 303 calculate the respective differences between the primary color components of two video signals at inputs 300 and 301 and comparison values at input 302. The sums of the absolute differences are formed in blocks 304 and 305 and are supplied to a comparator 307. The input signal having the greater difference to the comparison signal is forwarded by the multiplexer 308, which is under control of comparator 307. Since the comparison signal is the last signal that was output, the circuit ensures that the maximum difference signal is selected. The number of delay circuits and blocks MaxD depends on the

expected maximum distance between two respective support points (see page 14, lines 20 to 26). From the explanation above it is clear to the person of ordinary skill in the art that outputting video signals that have a maximum difference for two neighboring support points is supported in the specification and the drawings. Therefore, applicant's specification provides ample support for the subject matter recited in claim 16. Accordingly, applicant requests withdrawal of the 35 U.S.C. 112, first paragraph rejection of claim 16.

35 U.S.C. 103(a) of Clams 15, and 17-20

Claims 15, and 17-20 stand rejected under 35 U.S.C. §103 (a) as obvious, and therefore unpatentable, over Scott et al. (US 5,097,518) in view of Gove et al. (US 5,530,482). Scott et al. disclose a method for arbitrarily selectable scaling of input images represented by pixels in lines and columns by combining (logical OR-ing) values of a number of pixels arranged in groups in an input image into a pixel of an output image, wherein the groups have a minimal variation in size and group sizes are periodically varying along a line or column. However, Scott et al. fail to teach distributing support points of two successive lines or columns such that the support points of one line or column have an offset with respect to the other line or column. Gove et al. teach sampling successive lines of an analogue video signal in such a way that the spatial positions of resulting sample values match the spatial positions of pixels in a spatial light modulator having staggered pixels.

As is generally known to the person of ordinary skill in the art, analog video signals have no distinct pixel structure within a respective line. It is also generally known to the person of ordinary skill in the art that within spatial light modulators (SLM), such as light valves, LCD elements, and digital mirror devices (DMD), each element of an SLM constitutes a discrete element having a width and a height, thus possessing a distinct pixel structure. In other words, each element of an SLM covers a section of an analogue video signal. In Gove et al. the video signal reproduced by an element of the SLM is sampled at a distinct instant in time (at least implicit through the use of the term "sample") corresponding to the position of an element of the SLM. Gove et al. avoid distortions

during display of an image which would occur if the analog video signal was sampled at regular instants in time such as for a matrix display.

It is obvious, that if an image having the pixels arranged in a matrix were reproduced on a display having a staggered arrangement of pixels in successive lines, the image would be distorted. In other words, to avoid distortion when reproducing images using an SLM having staggered elements, Gove et al. would select from an analog video signal having no distinct pixels, pixel values at those positions within a line of the analogue video at which a respective element of a spatial light modulator is located. Thus, the output image in Gove et al. would no longer be arranged in lines and columns in a matrix.

In contradistinction, applicants claimed invention is directed to scaling of an image that is present in distinct pixels horizontally and vertically arranged in a lines and columns in a matrix, and the output image again is composed of pixels arranged in a matrix. Nothing in the specification even only hints to an output image that is not present in a matrix.

Simply applying Gove et al. for scaling of a video image that consists of pixels arranged in a matrix could lead to an undesirable sampling at the border between two pixels, depending on the number of pixels per line/column in the input image and the number of elements in a line/column of the SLM. In fact, Gove et al. is not related to scaling of a video image from a first matrix size to a second matrix size, but merely with matching an analog video image onto an SLM staggered arrangement of elements. The person of ordinary skill in the art would, therefore, not consider Gove et al. when trying to find a solution to the scaling problem.

In accordance with applicant's claimed invention, offsetting the support points between two successive lines/columns in the input image used for determining pixels in the respective lines/columns of the output image advantageously reduces the probability that very fine structures, lying along lines or columns of the input image, are suppressed merely because they are coincidentally located in a group of lines/columns which contain structures having features/values that are preferably selected by a selection algorithm used for determining output pixels. For example, if no offset between support points in successive lines is provided, the groups of pixels between the support points form groups

of vertical columns, from which, in each respective line, an output value is determined. If a group of columns of the input image includes a fine vertical structure adjacent to a vertical border of the group of columns, and a coarse vertical structure having dominant pixel values, the dominant pixels values of the coarse structure would prevent the pixel values of the fine structure from appearing in the output image, even in case the neighboring group of columns had no such structure at all. The term dominant pixel value refers to a pixel value which is preferably chosen by a scaling algorithm, e.g. a maximum value. However, even in an averaging algorithm the dominant value would dominate the result.

But, if the support points in the input image are staggered, no such groups of columns are created. A fine structure vertically extending across a number of lines would be part of groups of pixels not lying directly above each other in successive lines. The probability of a pixel having a dominant value in the same group of pixels in which a pixel of the fine structure is located is reduced, making it more likely that the fine structure is not suppressed, and as a result less information is lost in scaling.

Those parts of the specification of Grove et al. related to scaling, such as Figure 7, merely disclose commonly known techniques of interpolating pixels at positions between two existing pixels for up-scaling at integer ratios. Scaling, in particular down-scaling, at ratios corresponding to rational numbers or fractions is not disclosed or even mentioned in Grove et al. Further, in all of the examples disclosed in their patent, Gove et al. assume image data already sampled in staggered format (see e.g. column 7, line 15 and lines 48-49), which would also prevent the person of ordinary skill in the art from using Gove et al. in combination with Scott for achieving the invention as claimed in claims 15 to 20.

The mere fact that staggered pixel displays may have a perceived better horizontal resolution would not automatically lead the person skilled in the art to apply staggered pixels in a scaling method. Information that has been lost in a prior scaling step can not be displayed, irrespective of the type of display. Applicant's claimed scaling method is not dependent on a certain type of display or properties thereof. Further, the claimed invention is not directed to improving display of fine details in a video signal, but rather to a scaling method that prevents fine details from being lost in scaling for matrix display. Alleging that the person skilled in the art would use Gove et al. in combination with Scott

only because staggered pixel pattern are known appears to be based on improper hindsight driven by the desire to produce obviousness over arbitrary prior art. In view of the above discussion, applicant respectfully requests withdrawal of the 35 U.S.C. 103(a) rejection of claim 15.

Claim 17 depend from claim 15 and incorporates by reference all of the features thereof. Thus, claim 17 patentably distinguishes over the art for the same reasons as claim 15.

Claim 18 is directed to an apparatus adapted to execute the method of claims 15 and thus patentably distinguishes over the art of record for the same reasons as claim 15.

Claim 19 is directed to a film scanner with a drive for a control monitor, which is configured to execute the method of claim 15. Thus, claim 19 patentably distinguishes over the art for the same reasons as claim 15.

Claim 20 is directed to a film scanner with a drive for a control monitor, which is configured to include a scaling circuit of claim 18, thereby including the limitations of this claim. As discussed above, claim 18 patentably distinguishes over the art of record, thus rendering claim 20 patentable as well.

35 U.S.C. 103(a) Rejection of Claims 16 and 17

Claims 16 and 17 stand rejected under 35 U.S.C. §103 (a) as obvious, and therefore being unpatentable over Scott et al. (US 5,097,518A) in view of Gove et al. (US 5,530,482A) and Jung (US 2003/0185451 A1):

The Scott et al. and Grove et al. references have been discussed previously an d a further description will not be repeated here. The Jung published application seeks to determine whether the difference in luminance of two adjacent blocks is visible and uses the result for deciding whether to apply filtering or not for reducing block artifacts. Jung does not teach scaling, using the maximum difference between video signals for determining the pixel value selected for reproduction in an output image.

As discussed above, claim 15 patentably distinguishes over Scott et al. in view of Gove et al. Jung is not related to scaling, whereas the invention is directed to scaling. The mere fact that Jung teaches the step of determining a maximum difference for deciding

whether to apply filtering or not does not automatically lead a person of ordinary skill in the art to consider the teaching of Jung in a method for scaling.

In the context of the invention, scaling reduces the number of pixels in an image. The filtering disclosed in Jung is applied after an image has been processed, for removing visible artifacts produced by the prior applied processing. That is, the filtering step is performed after any processing. In a non-processed image no artifacts are present at all which would require application of Jung's teaching. If the process is a scaling process, any filtering applied can only be based on the reduced information that is present after scaling.

Applicants claimed invention, however, uses information about maximum differences before applying the processing, i.e. the scaling, which would not be necessary in Jung's logic. The mere existence of a disclosure teaching identifying maximum differences in adjacent parts of an image does not even give the smallest hint as to why and how this disclosure can be used in a scaling process. This is particularly true in view of Jung being directed to reducing artifacts after applying processing. The mere existence of a known element cannot prevent patentability of a prior unknown application or use of this element. Otherwise, any patent involving, for example, a screw for fastening something would be rendered obvious because using screws for fastening is known. The combination of Jung with Scott et al. and Gove et al. appears to result from improper hindsight driven by the desire to somehow produce obviousness over an arbitrary collection of prior art disclosures. In view of the above it is respectfully requested to withdraw the rejection.

Claim 17 depends from claim 15 and therefore patentably distinguishes over the art of record for the same reasons as claim 15.

In summary, the prior art clearly fails to mention or suggest the problem of fine details disappearing when support points are selected at regular distances reoccurring across successive lines or columns. Therefore the principles as claimed in amended claim 15 and those that depend therefrom are patentable in view of the cited art.

Conclusion

In view of the foregoing amendments to the claims and the accompany remarks, applicants solicit entry of this amendment and allowance of the claims. If, however, the Examiner believes such action cannot be taken, the Examiner is invited to contact the

applicant's attorney at (609) 734-6820, so that a mutually convenient date and time for a telephonic interview may be scheduled.

Kindly charge the cost of the additional independent claim, as well as any other fees that may be due, to Deposit Account **07-0832.**

Respectfully submitted,
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October 12, 2007